UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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February 8, 2008

Reply To: ECL-115

Mr. James M. Anderson
DEQ Northwest Region
Portland Harbor Section
2020 SW Fourth Ave, Suite 400
Portland, OR 97201

RE: GASCO Groundwater/DNAPL Source Control Focused Feasibility Study, November 2007

Dear Mr. Anderson:

EPA has reviewed the above referenced Focused Feasibility Study (FFS) for the Gasco Site for consistency with the long-term cleanup of Portland Harbor and consistency with other work being performed within the Portland Harbor Superfund site. EPA is pleased that this site has moved closer toward evaluating source control technologies and constructing controls for the ongoing discharges to the Willamette River. Based on the information provided in this document, EPA provides the following comments for DEQ to consider in proceeding forward with its decisions regarding upland source control at this site.

1. The FFS does not consider all typical, effective, and feasible options for source control for Manufactured Gas Plant (MGP) sites. The stated objectives for source control at GASCO is to contain the NAPL so it does not continue to move beyond site boundaries into and under the river and contain dissolved phase plumes also leaving the site. However, hot spot/source area removal or treatment is not considered or analyzed to assure long-term effectiveness of the containment technologies. Removal of heavily impacted soils, to the extent technically feasible, should be evaluated as part of the final remedy for source control. The evaluation should include excavation, handling and treatment/disposal needs as components of the removal option.

   While the FFS does discuss remediation options for NAPL contaminated areas, it dismisses each of those as not feasible (see Table 2 and Section 6.6 of report). EPA sees two major problems with that section: 1) it does not seem to attempt to deal with soil/NAPL removal by excavation in the upper zones, where a large amount of the contamination is present; and 2) many of the technologies are discarded because of the combined PAH and cyanide incompatibility in treatment trains. Since it seems the highly concentrated areas of cyanide (much of it near the north end of the site) are not highly contaminated with PAHs and the major PAH contamination sources in the "mobile NAPL" (areas

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where TarGost was used) are not as highly contaminated with cyanide, it seems reasonable to attempt to separate the remediation technologies by areas before reaching conclusions that nothing can be done at the site except pump and treat near the shoreline. The logic that appears from this presentation is that there is no single technology that can work for dissolved, NAPL, and soils, especially where the contaminants include both PAHs and cyanide. EPA suggests that what is necessary to begin the process of remediation is to separate the site into areas, contaminant types, media of concern, and dissolved or NAPL. Then the use of sequential treatment methods can be adapted to the site.

The concept presented in this draft Focused Feasibility Study (FFS) is that using only limited hydraulic control of dissolved contaminants is sufficient to control sources to the Willamette River. While it may provide short-term controls necessary for EPA to conduct in-water removal actions, it would, at the very least, make it difficult for EPA to conduct in-water remedial actions. The FFS presents a picture of source material NAPL moving laterally toward the river as well as some of it sinking deeper. Likewise, groundwater moving through and around the source material NAPL dissolves constituents which move more quickly off site with groundwater flux. Early removal of the source material will decrease the mass of material subjected to continual dissolution. Additionally, source material removal will decrease the amount of NAPL that will continue over time to travel to the river. The basic technologies evaluated in the FFS, e.g., a wall to contain the NAPL and hydrologic control to contain the dissolved phase, will be more effective in the long-term if source material is removed.

EPA considers the source material at this site to be all areas delineated in the TarGost data presentation (appendix G, Figure G1). The source material present at the site should be removed to the extent possible, which may require work plans in the scale of mining, highway soil excavation and removal, or subsurface building construction projects, rather than on the scale of a small scale leak of dissolved material which can be controlled or remediated using pump and treat systems. As presented, even assuming that there are sufficient wells to contain the discharge, the system will only contain some of the dissolved contamination as long as the pumping remains functional, and never have any impact on the sources which are the cause of the dissolved plumes. For Source Control, such a system would not be acceptable due to its built-in, long-term inefficiency, where the source is never cleaned in spite of all the expenditures of funds and the energy wasted. In addition, an active hydraulic control system without source removal requires continuous vigilance and monitoring with very little margin for errors or equipment failures.

The barrier wall proposed is very limited in depth and lateral extent, and should also be extended to be a more fully enclosing system, which would prevent any water from continually entering the DNAPL source zones and becoming contaminated. A final source control action should ensure, at a minimum, that the sources are enclosed by a barrier wall and then the source excavated to remove as

much of the source material as possible. Once that is accomplished the hydraulic pump and treat systems, as well as potentially some level of monitored natural attenuation may be able to keep contaminant plumes from re-developing and reaching the river again. Additionally, it is preferable that the hydraulic pump and Treat systems be located further upland to allow for monitoring wells to be installed to ensure that the groundwater plume and NAPL are "controlled" prior to reaching the river.

A final source control action should include a more detailed presentation of source removal technologies, including deep soil removal inside of rigid containment structures (with dewatering as needed to allow work to depth), oil field type extraction techniques once the area is contained to avoid discharges to aquifer, including recharging extracted water to mobilize the source material, and thermal extraction. Source removal should be reconsidered for this source control action.

2. NAPL removal (both light and dense), should be evaluated in the FFS. The evaluation should also consider measures to limit the mobility by control, containment, or in-situ treatment where NAPL removal is not technically feasible.

   The FFS has a mixed discussion of controlling NAPL and dissolved contaminants, and the model is meant to control dissolved contaminants, not NAPL. It is not clear that any of the pumping would help to control DNAPL movement. One specific concern is that a change in hydraulic conductivity can easily change by an order of magnitude depending where on the site the aquifer tests were done, which may make the stated extraction rates presented (12 to 20 gpm) increase substantially. Without that level of detail it is not possible to determine whether the proposed pumping rates are even in the correct range. While some of the interpretation is presented in Appendix E, there should be more discussion of the overall estimate of uncertainty.

   Another concern is that the information presented in the Appendix E indicates that there are multiple assumptions that had to be made to do the calculations due to: the limited depths and screening of the pumping wells; the location of the wells near the river; and the much higher hydraulic conductivity near the river and at depth in the aquifer. Regardless, the issue is that the results of the model should be used only for general planning and design purposes, and the final acceptance should be based on well-defined criteria for hydraulic containment of both NAPL and dissolved contaminants, based on capture zone analysis, and on monitoring that will meet the criteria for capture zone monitoring requirements. Note that there should be contingencies for variability in the river stage, and that the modeling and actual capture need to account for worst case conditions (high precipitation, low river stage, post flood events, etc.), not just an average.

3. The FFS does include much data of high quality, especially the new TarGost data, which does help to delineate the vertical presence of NAPL very well,

characterize the source areas and delineate where the work should be concentrated. However, the report only has data for the areas closer to the river, which may not cover all the important source area. Further, there is a gap between the data available, the high concentrations and large areas (and volumes of contaminants), and the proposed remedial actions. It is this discrepancy between the contamination extent and the proposed solution that presents the major problem with this plan. There is limited discussion on what would control the movement of the NAPL, or how the proposal will not remediate the contamination sources at the site. The areas beyond the presently delineated zones need to be considered in a final source control determination for enclosure by other barrier walls if those areas will not be removed. This should also be included, at least in concept, in the next version of the FFS.

4. The document should include detailed conceptual descriptions and references to key topics related to hydraulic containment, such as "Capture Zone", which refers to the three-dimensional region in an aquifer that contributes the water that is extracted by pumping from one or more wells or drains. Similarly, any final source control action should include sections which propose conducting a long-term monitoring optimization (LTMO) of the site and proposed pumping systems, and considerations related to Cost Effective Design for Pump & Treat Systems EPA 542-R-05-008, April 2005.

5. The modeling provided in Appendix E has a reasonable level of discussion, and a significant amount of analysis to interpret the pump test data and to support the results; however, there are many limitations to the usefulness of the pumping which are not highlighted in the main text. Below are some quotes from Appendix E that illustrate these limitations -

> "It is also worth noting in Figure 3-2 that the water level at MW-4-57 is very close to the river stage. This indicates that there is a strong connection between the river and the aquifer, which is also evident in the tidal response. This suggests that contact between the river and the aquifer is through higher K sandy material and that nearshore silt or silt lenses in the aquifer do not significantly affect the connection between the river and the aquifer. If silty sediments affected the connection between the river and the aquifer, there would be a greater water level drop between the aquifer and the river." (Page 20 Appendix E)

> "The capture zone analysis was also used to evaluate the depth of capture. One of the objectives of the modeling analysis was to determine the pump rate necessary to capture to approximately 130 feet bgs based on the vertical extent of contamination in the aquifer. The capture zone analysis showed that a pump rate of 20 gpm per well was sufficient to capture the full vertical extent of the aquifer and that fine tuning the pump rate to only capture to a specific vertical zone was not practical. This is due to the tendency for breakthrough to occur horizontally around the edges of the

wellfield even though the capture zone extends to the base of the aquifer in the center of the wellfield." (Page 27 Appendix E)

"A groundwater flow model has been developed to evaluate groundwater flow in greater detail and to provide a tool for evaluation of Feasibility Study (FS) alternatives. The modeling approach has been presented to DEQ, so only an overview of the model setup and calibration is presented here." (Page 20 Appendix E)

6. Residual contamination should be evaluated for the feasibility of in-situ treatment or containment for any groundwater source control action. Groundwater controls should be prioritized to first remove and/or treat the plume and lastly contain the plume. Natural attenuation should only be considered if the source area is removed, contained or treated. EPA supports a proposal for a pump and treat system, in conjunction with source removal, and as a continued system after that removal. However, the pump and treat system needs to incorporate detailed elements to document a capture zone for the entire system (note that EPA has a draft document on what is expected for capture zone documentation). That level of detail is not even proposed in this FFS. While this would not be expected to be covered in detail in this document, it should be included as one of those key items which will verify that the hydraulic containment is working as planned, and if not the system can be altered (increasing pumping rates or adding extraction wells) as needed. The revised FFS proposal needs to have this level of commitment and level of detail included.

7. Where a significant source of contamination to the Willamette River exists at a site, the evaluation of cleanup alternatives should include a preference for controls that remove and/or treats the source material. The beneficial uses of the Willamette River are the future uses that source control actions need to consider. As a point of comparison, it should be noted that the New York State Department of Environmental Conservation has identified 194 MGP in the state, and has Records of Decision (ROD) for all but 27 of them. Most of those RODs include soil and / NAPL excavation and removal as part of the remedial work. That information can be reviewed in more detail at the following links:

   http://www.dec.ny.gov/chemical/24913.html
   http://www.dec.ny.gov/docs/remediation_hudson_pdf/mgp_strat.pdf

8. When a revised FFS is presented it should include a discussion of the main remedial objectives and how any proposal will accomplish that objective. In this FFS there are a mixture of objectives and proposed actions, which do not seem to be fully developed to show that each proposal (a barrier wall to a given depth, or a pump and treat system, or both) will meet the necessary objectives for the site for both the short term and the long term. Of major concern is that the FFS does not include points of compliance or specific chemical performance standards for the action to achieve; guidelines do not constitute performance standards. While key factors, such as hydraulic conductivity parameters and related calculations were

measured, estimated and calculated, and interpreted in multiple manners, the levels of uncertainty for the effectiveness of the calculated pumping rates and how those relate to the objectives is not clear.

The draft FFS does not propose concepts and options that will make this site either controlled or stable in the short and long terms. The revised version should present a proposal that is based on a combination of individual, but coordinated approaches (removals, containment of NAPL, treatment trains, etc.) which will provide containment and remediation which is effective in both the short and the long term coupled with a monitoring scheme to show effectiveness of the control. What has been presented in this report is not sufficient for containment and does not include any type of permanent remedial technologies to decrease permanently the contamination sources at the site.

If you have any questions or would like to discuss the contents of this letter further, please feel free to contact me at (206) 553-7216.

Sincerely,

Deb Yamamoto

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Office of Environmental Cleanup

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